

UNIVERSITY OF CALIFORNIA

# NOISE ELEMENT OF THE GENERAL PLAN OF THE CITY OF ANAHEIM



AUGUST, 1978

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## PREFACE

This document has been prepared as the official policy and implementing document for the State mandated Noise Element. It is based on the findings and noise measurements obtained within the City by J. J. Van Houten & Associates during the latter months of 1977 and early in 1978. In addition, the Planning Department of the City has been significantly involved in the review of the findings and preparation of the Element.

This document provides an Element of the General Plan pursuant to the State Law and a reasonable approach to its implementation based on the present technological level of community noise control.

## INTRODUCTION

Physical health, psychological stability, social cohesion, property values, and economic productivity are factors affected by excessive amounts of noise. Noise, as it has been simply defined is "unwanted sound". It permeates man's environment and causes disturbance. The full effect of such noise on the individual and the community will vary with its duration, its intensity, and the tolerance level of the individual.

Recognizing the increasing human and environmental impacts of noise pollution, and the impact local agency land use and circulation plans have on the community environmental quality, the California Legislature in 1972 mandated that a Noise Element be included as part of the City and County General Plans.\*

## PURPOSE

The purpose of the Noise Element is to serve as an official guide to the City Council; the Planning Commission; City Departments; individual citizens and businessmen; and private organizations concerned with noise pollution within the City of Anaheim. The Element provides a reference to be used in connection with actions on various public and private development matters, as required by law. The Element includes definitions, objectives, policies, standards, criteria, programs and maps which are to be used when decisions are made affecting the noise environment within the City of Anaheim. It is utilized to establish uniformity of policy and direction within the City concerning actions to eliminate or minimize noise pollution and for decision making on proposals which may have an impact on the City's environment.

\*Guidelines have been prepared as a result of Senate Bill 860(A) (effective Jan. 1, 1976) by the Office of Noise Control, State Department of Health concerning the specific requirements for a noise element which is responsive to the Code. Appendix A provides text of the pertinent section of the Code.



## GOALS

- . To establish the appropriate standards and related technological base for the adoption of a Noise Control Ordinance similar to that now being enforced by the County of Orange.
- . To provide sufficient information concerning the community noise environment so that noise may be effectively considered in the land use planning process and the continuing enforcement of the Council's Policy concerning noise control in residential construction.
- . To develop strategies for abatement of excessive noise exposures involving mitigating measures in combination with re-zoning as appropriate to avoid incompatible land uses.
- . To protect those existing regions of the City for which noise environments are deemed acceptable and also those locations throughout the City deemed "noise sensitive".
- . To establish the community noise environment, in the form of noise contours for local compliance with the State mandated Noise Insulation Standards.
- . To encourage the reduction of noise from all sources such as motor vehicles, industrial/commercial activity, aircraft operations, home appliances, and railroad movements.
- . To promote increased public awareness concerning the effects of noise and provide methods by which the public may assist in reducing noise.



## POLICIES

The following provides a listing of the Noise Element Policies. These policies are stated in two broad categories as follows:

1. Those policies which lead to quantifiable standards and/or regulations and are within the realm of the City's direct control, and,
2. Those policies which are not quantifiable and/or are not subject to the control and implementation directly by the City.

### POLICIES UNDER THE CONTROL OF THE CITY

- . The City shall develop acceptable noise standards consistent with health and quality-of-life goals and employ effective techniques of noise abatement through such means as a noise ordinance, building code amendment, subdivision and zoning regulation.
- . Criteria for location of certain "noise sensitive" land uses and related developments such as residential projects, schools, convalescent hospitals and hospitals shall be established. These developments shall be adequately designed and insulated to protect occupants from unusually loud exterior noise.
- . The City shall continue to enforce the noise standards of the State of California Motor Vehicle Code and other State and Federal legislation pertaining to motor vehicle noise.
- . Acoustical privacy, consistent with the Noise Insulation Standards (California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4) and all existing and future requirements outlined in the State Housing Code, shall continue to be strictly enforced for both single and multiple family residential construction.

- . Noise standards, the application of insulation and other noise control methods in new schools, hospitals and convalescent homes shall be consistent with State and Federal Regulations.
- . The City shall participate in the planning activities of County and State Agencies relative to the location of new airports and the assessment of their impact on the environment of the City of Anaheim.
- . The noise produced by existing industrial operations shall be regulated by enforcement of a noise ordinance.
- . Regulation of noise from industrial activities through various forms of licenses, conditional use permits, and zoning regulations, to meet standards that limits the maximum permitted intrusive noise levels across commercial and residential boundaries shall be considered in all new construction.
- . Standards to regulate noise from construction activities shall be expanded and enforced. Particular emphasis shall be placed on the restriction of the hours during which, other than emergency, work may occur.
- . Permits shall be required for the use of sound amplification equipment within public spaces, in proximity to noise sensitive areas and/or on streets and highways within the City.
- . Sound amplification equipment shall not be used within public spaces, in proximity to noise sensitive areas and/or on streets and highways within the City during the late night and early morning hours.
- . The noise produced by home appliances, air conditioners and swimming pool equipment shall not be permitted to intrude upon the peace and quiet of adjacent residential spaces.

- . The noise produced by power tools, lawn mowers, power edgers, etc. shall not intrude upon adjacent residential spaces during the late evening, night and early morning hours.

## POLICIES - ACTIVITIES NOT UNDER CITY CONTROL

### STREETS AND FREEWAYS

- . When constructing new freeways, modifying freeway ramps or freeway access on right-of-way within the City, the City shall encourage that preference be given to methods of design which reduce noise impact on adjacent lands.
- . Employment of noise mitigation measures in the design of all future streets and highways and establishment of buffers between the arterials and adjoining noise sensitive areas.
- . Where appropriate, sound walls, berms and landscaping along existing and future highways and railroad right-of-ways, to beautify the landscape and reduce noise shall be required.

### MOTOR VEHICLES

- . The City shall recommend legislation for the reduction of the noise impact of automobiles, motorcycles, buses and trucks by lowering the level of sound these vehicles produce.
- . The City shall require adequate noise suppression devices (mufflers, etc.) for all motor vehicles operated within the City.

### RAILROADS

- . Encourage the operators of spur lines within the City to minimize train horn soundings at locations in proximity to noise sensitive areas.
- . Encourage rail operators to limit late night and early morning train movements which cause annoyance at residential locations nearby.



- . Encourage rail operators to instruct their engineers to minimize the noise or their train movements when operating in proximity to noise sensitive areas.
- . Encourage rail operators to maintain their trackage as required to minimize rail movement noise.

#### AIRCRAFT

- . Encourage County, State and Federal authorities to limit or if possible, to eliminate commercial aircraft flyovers within the City.
- . Encourage Federal authorities to place limits and/or restrictions on general aviation aircraft movements in proximity to the greater Disneyland Convention Center and Anaheim Stadium areas.

#### ALTERNATIVE MODES

- . The City shall promote a more efficient, comfortable and quieter bus service.
- . The City shall encourage the development of alternative transportation modes which minimize noise within residential areas.
- . The City shall monitor the proposals for a fixed rail mass-transit system and shall require noise control to be considered in the selection of transportation systems which may affect the City of Anaheim.

#### RESEARCH AND LEGISLATION

- . Encourage and where appropriate require community noise surveys to be conducted as part of each community plan study, subdivision proposal and commercial or industrial development.

- . Recommend Federal and State research, standardization and legislation in the areas of revised motor vehicle noise standards, freeway and highway noise design criteria, noise mitigation and lane use sensitivity.
- . Encourage State and Federal Agencies in the research, development, standardization and labeling of quieter home appliances, power tools, air-conditioners and swimming pool equipment.

## NOISE EVALUATION CRITERIA & STANDARDS

A description of the character of a particular noise, requires at least the following:

1. amplitude and amplitude variation of the acoustic wave;
2. frequency (pitch) content of the wave motion; and
3. duration of the noise.

A Glossary of the most commonly used terms encountered in community noise assessment and control is provided on Page 40 of this Element. Of these terms, the scale of measurement which is most useful in community noise measurement, the A-weighted sound pressure level, commonly called the A-level or dB(A), is considered the most fundamental. It is measured in decibels to provide a scale with the range and characteristics most consistent with that of people's hearing ability.

This noise measure, its application to a measure of noise exposure, Community Noise Equivalent Level (CNEL), and its utility in the description of ambient noise levels are discussed in the remainder of this section.

### A-Weighted Sound Level

Throughout this Element, the magnitude of noise is indicated by application of the nationally recognized measure: The A-weighted sound level or dB(A). To establish the A-level, the acoustic signal is detected by the microphone and then filtered, heavily weighting those portions of the noise which are most annoying to individuals. This weighting of sound energy corresponds approximately to the relative annoyance experienced by the human senses from noise at various frequencies. The A-weighted sound pressure levels of a few typical sources of noise which are routinely experienced by people within the City of Anaheim are listed in Figure 1.



The A-weighted sound level of traffic noise and other long-term noise producing activities within and around the community varies considerably with time. Measurements of this varying noise level are accomplished by recording values of the noise for a specified period of time. Analysis of these recordings yields A-level values of noise which are useful in assessing the potential annoyance of the disturbance. For purposes of this study, the following values have been used:

$L_{90}$  - the near minimum A-level, 90% of the time the A-level is greater than this value.

$L_{50}$  - the central tendency of A-level, this value is exceeded 50% of the time during the measurement period.

$L_{10}$  - the near maximum A-level, is exceeded 10% of the time during the measurement period.

$L_{eq}$  - the energy averaged A-level, is most representative of the long term annoyance potential of the noise.

Readings of these measures are recorded to provide representative samples of the noise during the time period being examined (i.e. peak-traffic period, morning, afternoon and night, etc.).

#### Community Noise Equivalent Level (CNEL)

It is recognized that a given level of noise may be more or less tolerable, depending on the duration of exposure experienced by an individual. There are numerous measures of noise exposure which consider not only the A-level variation of noise, but also include the duration of the disturbance. The State Department of Aeronautics and the California Commission of Housing and Community Development have adopted the Community Noise Equivalent Level (CNEL). This measure considers a weighted average noise level for the evening hours, from 7:00 p.m. to 10:00 p.m., increased by 5 dB and the late evening and morning hour noise levels, from 10:00 p.m. to 7:00 a.m., increased

by 10 dB. The daytime noise levels are combined with these weighted levels and averaged to obtain a CNEL value. Figure 2 indicates the outdoor CNEL at typical locations.

### Annoyance and Health Considerations

In general, it must be recognized that noise is objectionable, and under certain conditions, may affect the average individual in any of the following ways:

1. General hearing loss or damage.
2. Impaired hearing for speech communication.
3. Interference with one's ability to understand oral communication.
4. Sleep interference.
5. Contributes to nervousness and tension.

Noise levels which exceed 85 dB(A), are generally considered to contribute to hearing loss. When experienced for long durations during each working day, an individual may experience severe temporary or even permanent hearing loss. State and Federal Health and Safety Regulations currently protect workers at levels of exposure which exceed 90 dB(A) for each eight (8) hour work day.

Speech communication and speech intelligibility is impaired and may even become impossible at levels from 65 to 70 dB(A). Sleep interference may be experienced at noise levels in excess of 35 dB(A). Generally accepted standards consider noise levels which are no greater than 45 dB(A) to be acceptable for sleeping spaces.

### Acceptable Exterior Noise (CNEL) Exposures

Figure 3 indicates the CNEL considered acceptable for various land use categories. In general, exterior noise exposures at residential locations should not exceed a CNEL of 65 dB.

The U. S. Environmental Protection Agency has promulgated a recommended policy for exterior noise exposures which in effect suggests that a CNEL which is no greater than 55 dB should be permitted within exterior living spaces. However, they emphasize that this level of exposure may not be economically feasible or in many cases a practical level to achieve.

## Acceptable Interior Noise (CNEL) Exposures

California's Noise Insulation standards were officially adopted by the California Commission of Housing and Community Development in 1974. The regulations became effective on August 22, 1974. The ruling states that "Interior Community Noise Equivalent Levels (CNEL) attributable to exterior sources shall not exceed an annual CNEL of 45 dB in any habitable room". Additionally, the commission specified that residential buildings or structures to be located within exterior Community Noise Equivalent Level Contours of 60 dB or greater of an existing or adopted freeway, expressway, parkway, major street thoroughfare, railroad or rapid transit line and industrial noise source shall require an acoustical analysis showing that the building has been designed to limit intruding noise to the levels prescribed (interior CNEL of 45 dB).

## Noise Ordinance Standards

The Office of Noise Control, State of California Department of Health, has prepared a Model Community Noise Ordinance. The standards and enforcement provisions of the model ordinance are consistent with that of a number of communities in California and follows the general format and provisions of the Orange County Noise Ordinance.

The portions of the Model Ordinance considered appropriate for the City of Anaheim involve Exterior and Interior Noise Limits as shown in Table I.

The Model Ordinance considers the potentially unique problems which may occur between the boundaries of two different land uses (such as between an industrial operation and residential spaces) as follows:

If the measurement location is on a boundary between two different zones, the noise level limit applicable to the lower noise zone plus 5 dB, shall apply.



The classification of different areas of the community in terms of environmental noise zones, under the provisions of the Model Noise Ordinance is determined by the appointed Noise Control Officer (or the City Council).

In consideration of the potentially annoying effect of steady tones (such as that produced by a transformer or the motor of a noisy swimming pool pump), repetitive noise, or specifically music, a correction is to be applied as follows:

CORRECTION FOR CHARACTER OF SOUND:

In the event the alleged offensive noise contains a steady, audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting, or contains music or speech conveying informational content, the standard limits set forth in Table 1 shall be reduced by 5 dB.

Sound Attenuation in Residential Projects

The City of Anaheim Council Policy (Policy Number 542) for noise control in residential projects, specifies that the exterior noise levels shall not exceed a CNEL of 65 dB and that the interior CNEL shall not exceed 45 dB. It states that residential developments within 600 feet of a freeway, arterial or railroad shall be designed to comply with these standards.

TABLE I  
NOISE ORDINANCE STANDARDS

Maximum Permissible Sound Levels by Receiving Land Use:

- (A) The noise standards for the various categories of land use identified by the Noise Control Officer as presented below shall, unless otherwise specifically indicated, apply to all such property within a designated zone.
- (B) No person shall operate or cause to be operated, any source of sound at any location within the City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other property either incorporated or unincorporated, to exceed:
  - (1) the noise standard for that land use as specified below for a cumulative period of more than thirty minutes in any hour; or
  - (2) the noise standard plus 5 dB for a cumulative period of more than fifteen minutes in any hour; or
  - (3) the noise standard plus 10 dB for a cumulative period of more than five minutes in any hour; or
  - (4) the noise standard plus 15 dB for a cumulative period of more than one minute in any hour; or
  - (5) the noise standard plus 20 dB or the maximum measured ambient, for any period of time.

---

EXTERIOR NOISE LIMITS

<u>Receiving Land Use Category</u>	<u>Time Period</u>	<u>Noise Level Standard (dBA)</u>
One & Two Family Residential:	10 pm - 7 am	45
	7 am - 10 pm	55
Multiple Dwelling, Residential, Public Space:	10 pm - 7 am	50
	7 am - 10 pm	55
Commercial:	10 pm - 7 am	55
	7 am - 10 pm	60
Industrial:	Anytime	70

A-weighted Sound Level dB(A)	
-150-	
-145-	
-140-	Sonic boom
-135-	
-130-	
-125-	Jet takeoff at 200'
-120-	Oxygen torch at operator ear position
-115-	Discotheque (at audience location)
-110-	Motorcycle at 15' to the side of a pass-by
-105-	Power mower at operator ear position
very Loud	-100- Jet aircraft flyover at 1,000'
	-95- Freight train at 50' to the side of a pass-by
	-90- Food blender at 3'
	-85- Electric mixer; alarm clock at 3'
Loud	-80- Washing machine; garbage disposal
	-75- Freeway traffic at 50' from right-of-way
	-70- Vacuum cleaner at operator ear position
	-65- Electric typewriter at 10'
	-60-
	-55- Normal conversation at 3'
	-50-
	-45- Refrigerator at 3'
Quiet	-40- Bird calls at 50' to 100'
	-35- Library (ambient of quiet air conditioning system)
	-30-
	-25-
	-20- Motion picture studio, interior ambient
	-15-
	-10- Leaves rustling
	-5-
Threshold of Hearing	-0-

FIGURE 1 Typical Values for Comparison of Various Noise Sources and Noise Levels (for reference only)



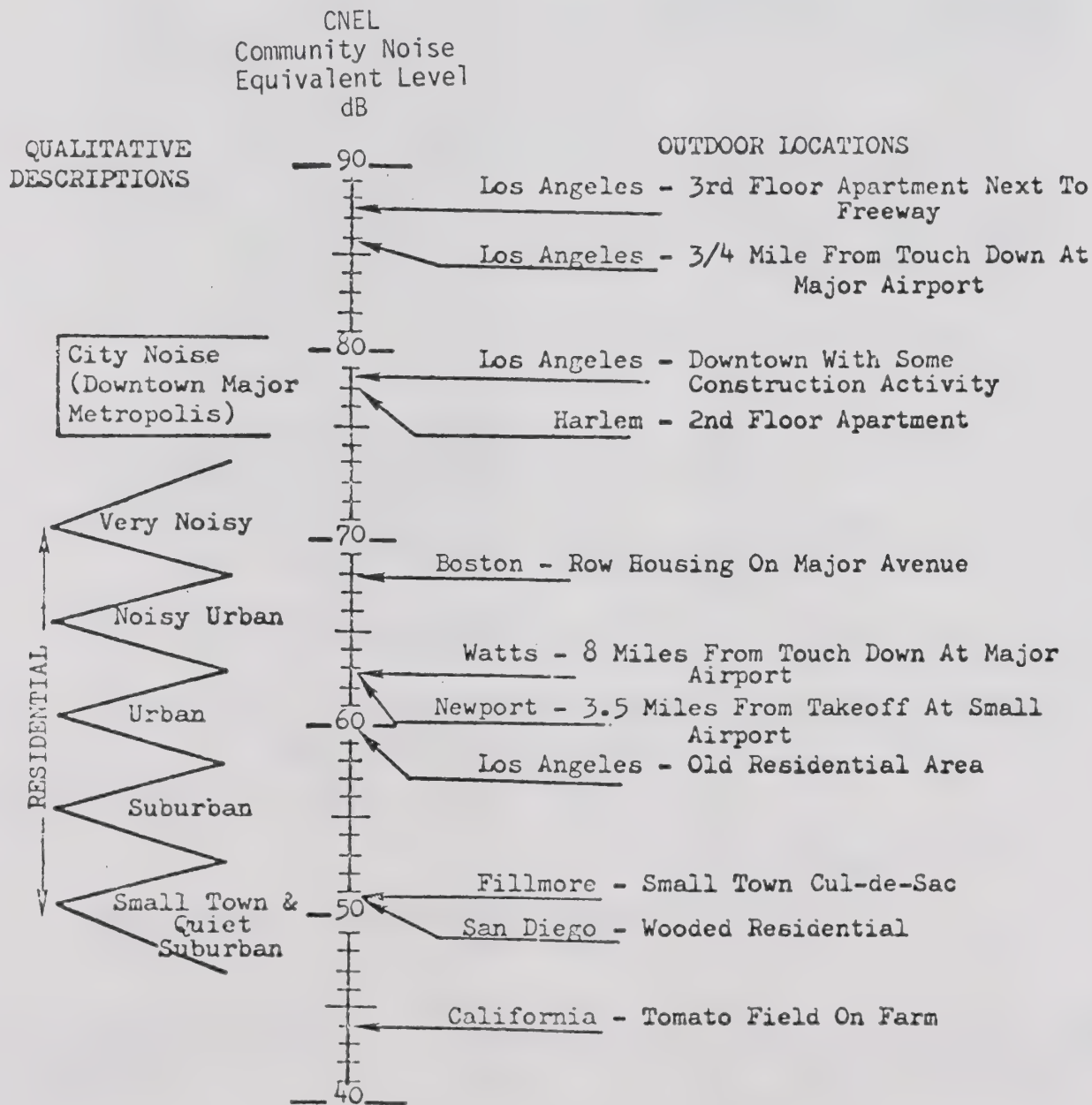
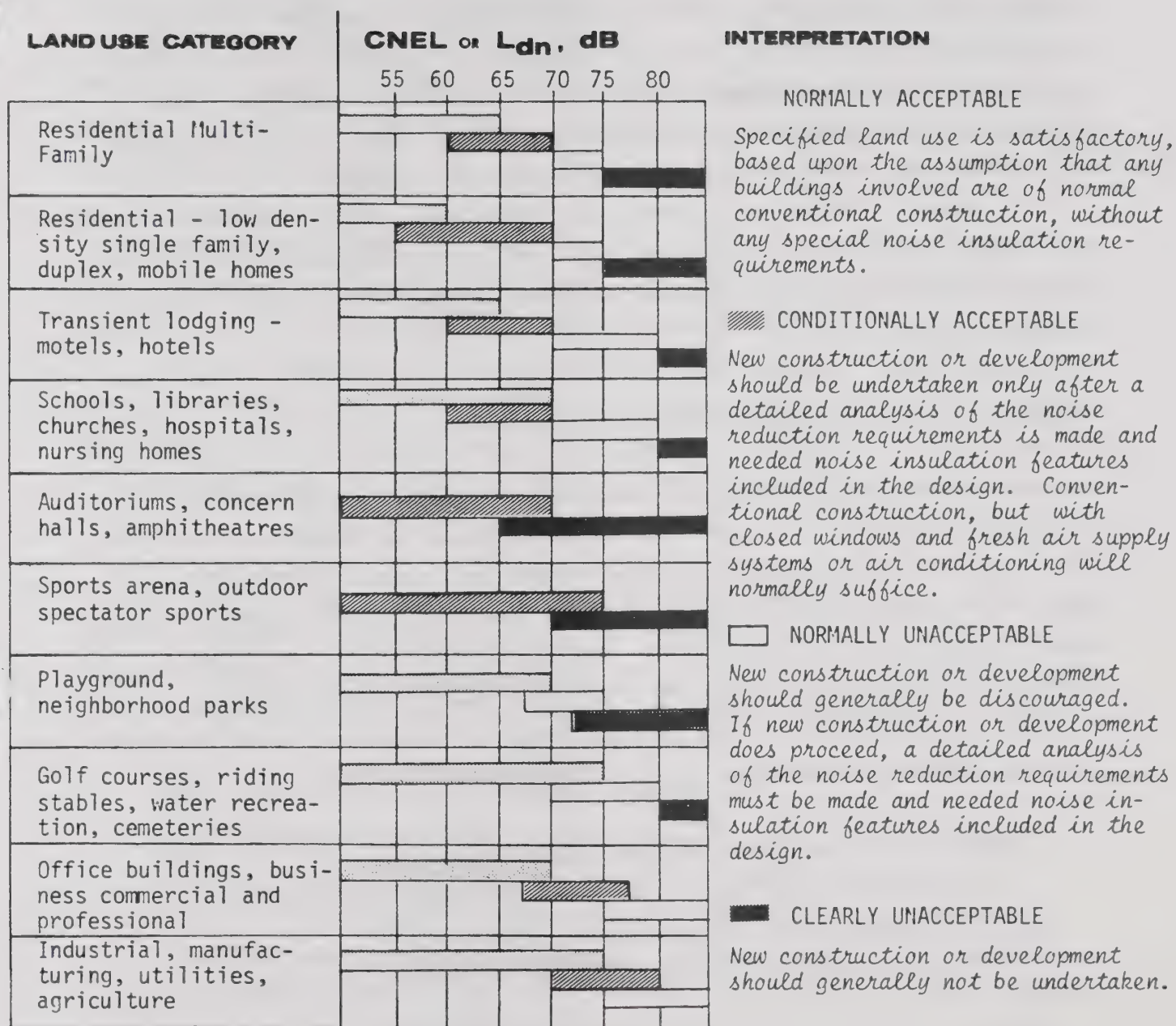


FIGURE 2 RANGE OF TYPICAL OUTDOOR NOISE ENVIRONMENTS EXPRESSED IN TERMS OF COMMUNITY NOISE EQUIVALENT LEVEL, dB.



SOURCE: In part taken from "Aircraft Noise Impact Planning Guidelines for Local Agencies", U.S. Dept. of Housing and Urban Development, TE/NA-472, November 1972.

FIGURE 3. Land Use Compatibility for Community Noise Environments

# NOISE SOURCE INVENTORY, EXPOSURE CONTOURS & SENSITIVE AREAS

Transportation noise is experienced, to some degree, throughout the City. Noise having significant magnitude is generated by traffic on the arterials and freeways within or bordering the City. In addition, numerous fixed sources of noise exist within portions of the City. Representative samples of these various noise producing elements have been obtained and are listed in the summary of noise measurement data, Appendix A. From these measurements, complimenting analytical procedures, and traffic projections to 1990, noise exposure contours have been derived for the City and noise impact zones are identified.

## Community Noise Equivalent Level (CNEL) Contours

Community Noise Equivalent Level (CNEL) Contours have been derived, accounting for each of the transportation noise producing elements within the City. The previously cited noise measurements and generally recognized analytical procedures have been used in the preparation of the CNEL Contour maps, Figures 4 and 5. In addition, the CNEL Contours for the projected (1990) noise have been prepared on City Street maps using a scale of 1"=600'. The procedures used to derive these contours essentially relies on research studies reported by:

- . National Highway Research Board (Reference 1,2,3).
- . U.S. Department of Housing and Urban Development (Reference 4,5).
- . U.S. Department of Transportation (Reference 6).
- . U.S. Environmental Protection Agency (Reference 7).





Contours are provided for CNEL values from 45 to 70 dB in 5 dB increments for the existing Figure 4, and projected (1990), Figure 5, environment within the City. The zone contained within the 65 dB contour is identified as the "Noise Impact Zone". The 70 dB contour was derived for the freeway and major highways, however, in most cases the 70 dB contour is only 20 to 30 feet from the highway or freeway right-of-way.

### Noise Source Inventory

Various locations within the City have been surveyed to establish the existing levels of noise. Noise measurements were obtained at 69 locations throughout the City. The measurement locations and levels recorded are listed in Appendix A. From these measurements the noise source inventory of Table II has been developed. Recordings of train noise are provided in Figure 6. Figure 7 provides a composite of construction activity noise levels and typical levels of heavy equipment noise.

The most significant noise producing activity within the City involves the transportation elements; arterials, freeways, railroads and to a much lesser extent aircraft flyovers. When included as part of the inventory of noise producing activity within the City, the transportation sources are summarized as follows:

#### Traffic on the Primary and Secondary Arterials

A significant portion of the noise experienced in the City is produced by traffic on the freeways and the primary and secondary arterials. Each of the significant arterials within the City have been considered in the development of the CNEL Contours, Figures 4 and 5. The increase in CNEL between the existing (1977) and projected (1990) noise environment within the City is expected to be no more than about one to two decibels.

#### Train Movements

Significant levels of train noise are produced along the mainline railroads and spur lines through the City. The location of the various lines are provided in Figure 8. The noise produced by the mainline operations

has been considered and is included in the CNEL Contours of Figures 4 and 5. The noise generated by the spur line train movements is not significant when measured on a CNEL basis; however, the short duration noise levels caused by these movements are significant and cause annoyance at residential locations adjacent to the lines.

Peak noise levels in the range from 75 to 85 dB(A) are experienced at residential locations adjacent to the spur lines. Since, these often occur during the late night hours and are accompanied by horn sounding levels as high as 85 to 95 dB(A) sleep interference is encountered.

#### Aircraft and Helicopter Operations

Portions of the City are subjected to noise exposure from aircraft operations into Orange County Airport. The impact of these operations on the City is considered minimal. However, a significant increase in the number of operations at the airport would likely have an adverse impact on the environment of residential locations in the most easterly portion of the City. For example, peak noise levels of 70 to 75 dB(A) are caused by aircraft flyovers in the vicinity of Anaheim Hills. These flyovers cause annoyance and disrupt the peace and quiet of people residing in the area. In the event that the number of flyovers were to increase, it is likely that the level of annoyance and complaints would increase significantly.\*

A significant number of general aviation type aircraft flyovers occur in proximity to the Disneyland, Convention Center and Anaheim Stadium areas. These flyovers are most prevalent on weekends and holidays. For example, on a typical Sunday morning or afternoon about 20 to 25 flyovers per hour have been observed. Each flyover produces noise levels in the range from 70 to 90 dB(A) depending on the altitude and location of the aircraft relative to homes within the area.

Police and Military helicopters generate short-term levels in the range from 85 to 95 dB(A). A significant number of military helicopter operations occur in the vicinity of Los Alamitos Naval Air Station. This

\* The ambient noise level in this portion of the community is quite low, therefore, the intrusion caused by aircraft flyovers is greatly pronounced.

facility is now devoted exclusively to helicopter activity. Since the Reserve Operations occur on weekends as well as during the week, significant annoyance is experienced at residential locations in proximity to the Station.

#### Noise Sensitive Areas

In general, all residential locations are considered noise sensitive land uses within the City. In addition to the residential locations throughout the City, schools, hospitals, libraries and convalescent homes are considered noise sensitive land uses. The location of these noise sensitive areas is indicated in Figure 9. The Housing Element of the General Plan provides a description of the residential areas throughout the City and is considered the source for the inventory of this noise sensitive land use.



TABLE II  
NOISE SOURCE INVENTORY<sup>\*</sup>  
CITY OF ANAHEIM

<u>NOISE SOURCE</u>	<u>RANGE OF NOISE LEVELS</u>
Jet Aircraft Flyover (Altitude 2000')	50 to 75 dB(A)
Truck Leaving Plant on private property at 50'	72 to 80
Trash Pick-up at 100'	75 to 95
Train Movement on Santa Fe Track at 100' from Track	80 to 90
Train Movement on Spur Line at 100'	75 to 85
Helicopter Flyover (Altitude of 200')	85 to 95
Truck on City Streets at 50'	75 to 90
Transit Bus at 50'	71 to 75
Motorcycles at 50'	65 to 90
Sports Cars at 50'	65 to 85
Traffic on the Freeway (at 50')	70 to 75
Traffic on the Major Arterials (at 50')	65 to 70
Car-Wash Facility (at 100')	65 to 70
Train Horn Sounding	Refer to Figure 6
Construction Noise	Refer to Figure 7

<sup>\*</sup> Typical values not representative of any one particular location within the City.



FIGURE 4







FIGURE 5



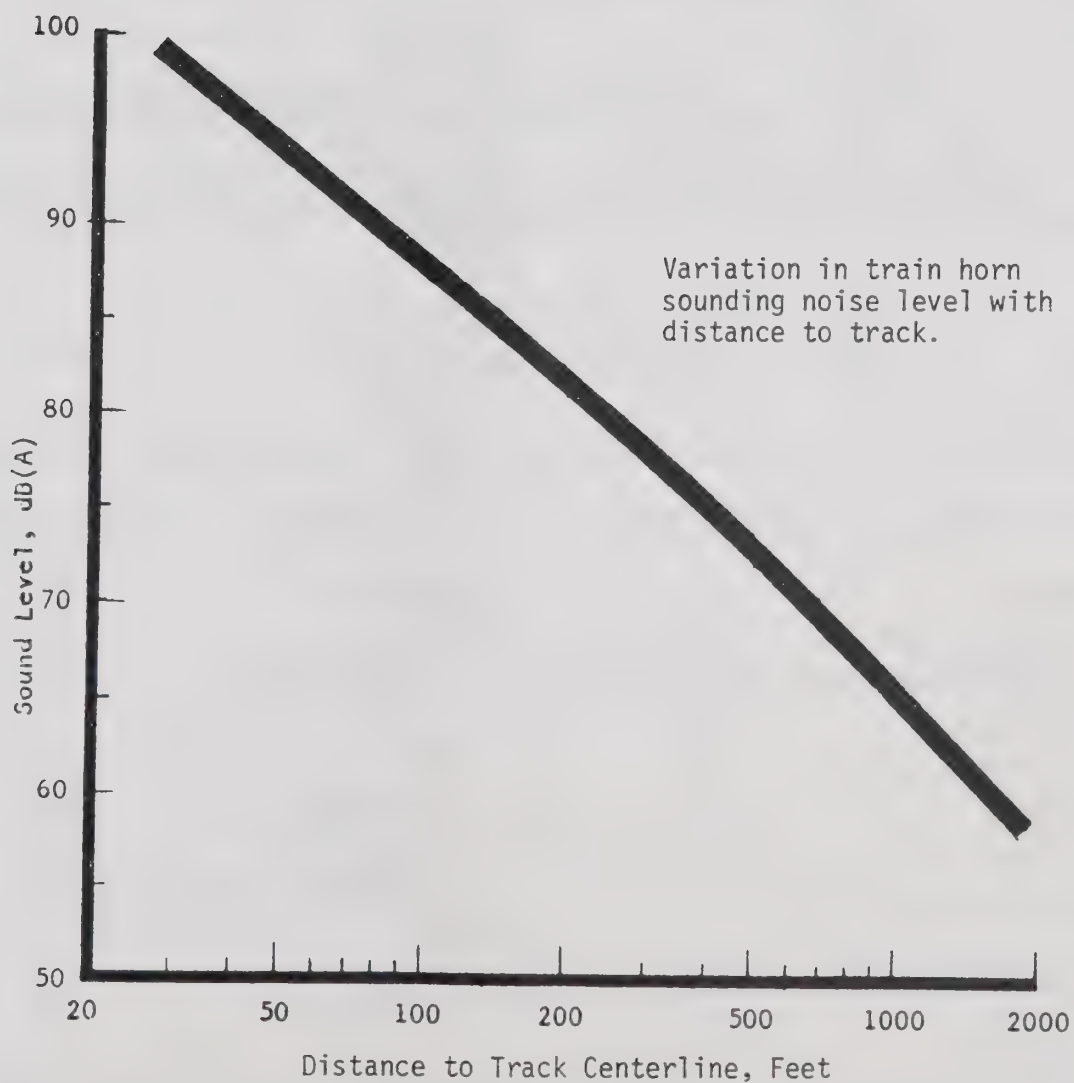
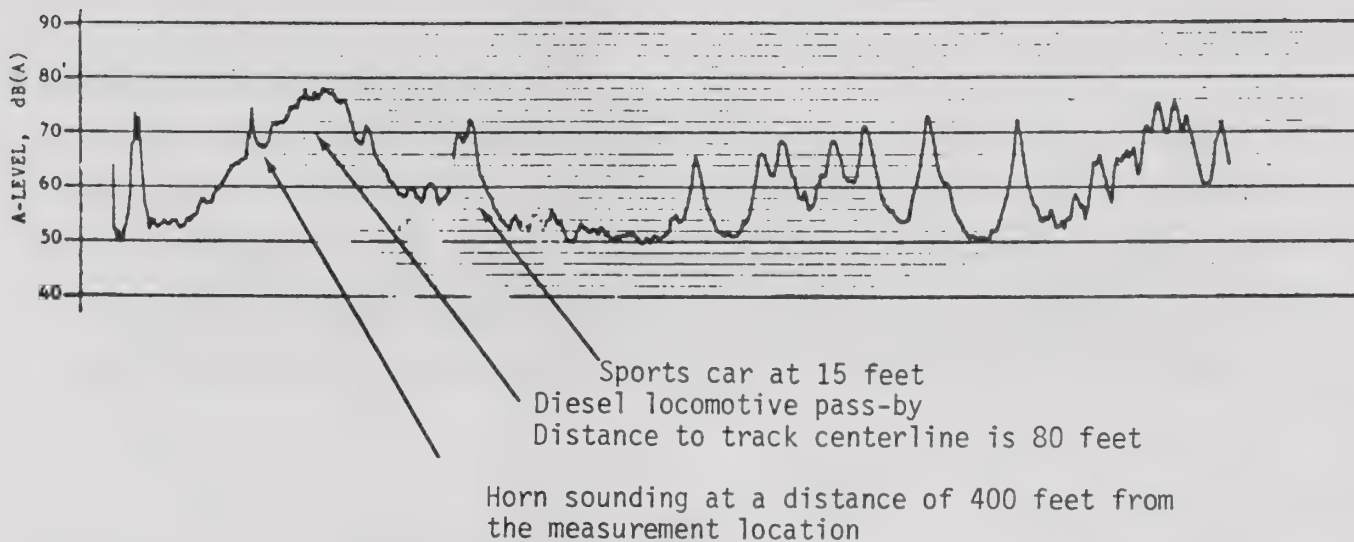
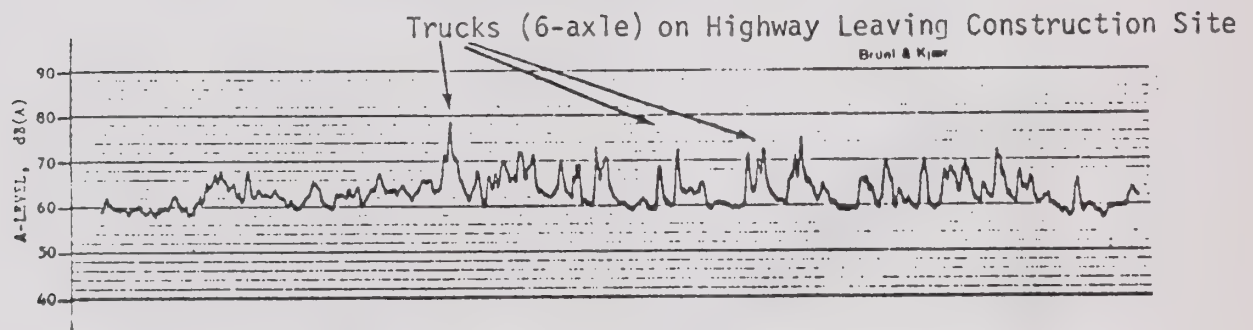
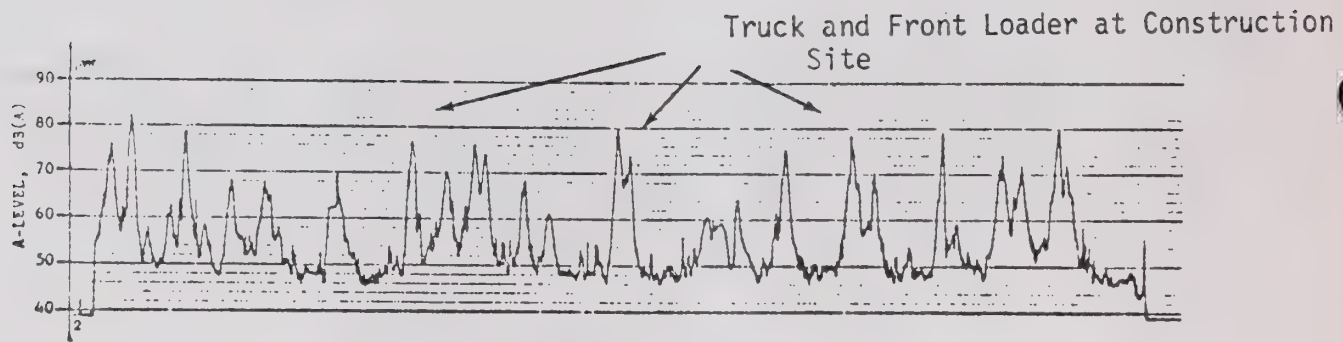


FIGURE 6 Typical Train Noise and Horn Sounding Levels





CONSTRUCTION EQUIPMENT NOISE LEVELS  
(measured at a distance of 50 feet)

Equipment	Noise Level	Equipment	Noise Level
Earthmoving		Stationary	
front loader	79 dB(A)	pumps	76 dB(A)
backhoes	85	generators	76
dozers	80	compressors	81
tractors	80	Impact	
scrapers	88	pile drivers	101
graders	85	jack hammers	88
truck	91	rock drills	98
paver	89	pneumatic tools	86
Materials Handling		Other	
concrete mixer	85	saws	78
concrete pump	82	vibrator	76
crane	83		
derrick	88		

FIGURE 7 Typical Construction Noise Levels



FIGURE 8







FIGURE 9



## IMPACT

When considering new residential development within the City, the noise source inventory and projected CNEL Contours should be examined to assess the potential impact of noise on the specific development as follows:

### Exterior Noise Control

Residential spaces to be located within a CNEL Contour of 65 dB or greater may be undesirable due to excessive noise. A detailed analysis of such spaces should be undertaken to determine their suitability and/or the need for noise mitigation by the use of barriers or building orientation. The exterior living space of new residential developments should not exceed a CNEL of 65 dB.

### Interior Noise Control

New multiple family residential units to be located within a CNEL of 60 dB or greater are required to include an acoustical analysis as part of the project design. This analysis must indicate that the interior living space of the units will not exceed a CNEL of 45 dB. Walls, windows, vents, roofing systems, etc., which reduce the exterior noise to the prescribed interior standard (45 dB) may be required to comply with the provisions of the Noise Insulation Standards (CAL ADM CODE: Title 25 Section 1094). Within the City of Anaheim all new residential construction (single or multi-family which is impacted by noise in excess of a CNEL of 60 dB should be examined as part of the design to insure that the interior living spaces do not exceed a CNEL of 45 dB.

The following provides an assessment of the impacts, related to noise, within the City of Anaheim:

### Freeway and Highway Traffic Noise

CNEL values at residential locations bordering the Freeways and arterial highways exceed 65 dB(A). Recognized standards indicate that these exposures are excessive and that some locations may be undesirable for residential use.



The CNEL within the exterior living space of residential locations adjacent to the Riverside (Route 91), Santa Ana (Route 5) and Orange (Route 57) Freeways is in the range from 70 to 75 dB. These levels are considerably greater than is considered acceptable and may constitute a health hazard to residence exposed for a long period of time.

#### Railway Movement

Noise levels at residential locations adjacent to the mainline of the Santa Fe Railroad through the City and along Santa Ana Street are excessive. Recognized standards are exceeded. The primary annoyance to residents involves the late night and early morning train pass-bys.

#### Construction Activity

The impact of construction activity noise is considered minimal for two or three months of activity which occurs during the daytime hours. Late night and week-end disturbance caused by construction noise may cause a significant impact when experienced at near-by residential locations.

#### Commercial/Industrial Noise

In general, commercial/industrial noise within the City is not considered excessive. Where residential locations are adjacent to heavy industrial zones a significant impact may exist, however, the noise survey of the City, Appendix I did not indicate that such conditions currently exist.

#### Schools, Hospitals and Parks

In general, the noise levels at most locations are not considered excessive. However, the park adjacent to the Route 57 Freeway exceeds recognized standards and portions of schools within the City, such as Anaheim High School adjacent to Lincoln Avenue and Canyon High School adjacent to Santa Ana Canyon Road are exposed to high levels of traffic noise at portions of the exterior recreational areas.

## MITIGATION

Residential locations directly adjacent to the freeways are exposed to traffic noise in the range from 60 to as high as 78 dB(A) during portions of the day. A barrier should be considered for those locations which are exposed to excessive levels (greater than a CNEL of 65 dB(A)). Particular emphasis should be placed on the Route 57 Freeway and portions of the Route 91 Freeway in the central part of the City.

Construction of a sound barrier to be effective and economically feasible, must be as close as possible to the near lane of traffic. This often requires the actual construction of the barrier on freeway right-of-way which is under State jurisdiction. Such construction requires the approval, cooperation and the coordination of construction with the State Department of Transportation.

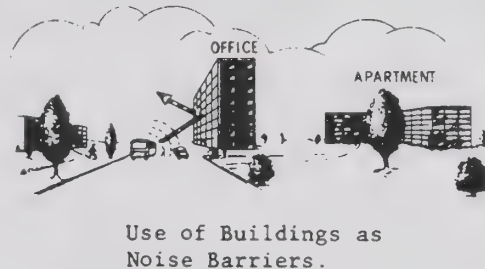
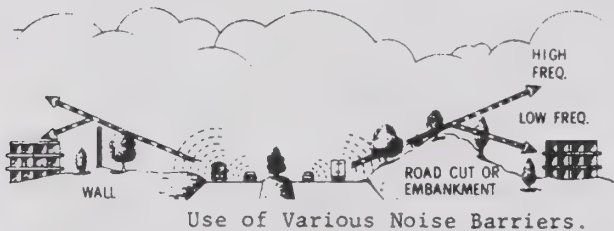
In general, the control of noise is most effectively accomplished by reduction of emissions from the source. However, the predominate source of noise within the City (motor vehicles) is under the jurisdiction of the State. Furthermore, the mitigation of noise from this source by the use of barriers, is very expensive and often difficult to achieve. The State now has a noise regulation as part of the Vehicle Code. The City should encourage its enforcement and may benefit as stricter regulations are adopted and enforced, particularly along the freeways. The U.S. Environmental Protection Agency is considering a policy and the ultimate regulation of vehicle noise. Some benefit may be experienced within portions of the City by this action, within the next few years.

In general, the following methods of mitigation should be considered for each of the primary noise generating activities within the City:

### Freeway and Arterial Highway Traffic Noise

The installation of noise barriers should be considered as a mitigation measure. Barrier heights of from 14 to 16 feet are needed at locations adjacent to the Route 57 Freeway and portions of the Route 91 Freeway within the City.

Acoustical analysis should be required of new developments within the 60 dB CNEL Contour of the Freeways, Highways and secondary arterials within the City. This analysis should indicate the existing and projected CNEL on the site and the method(s) by which the traffic noise, if found to be greater than a CNEL of 65 dB, is to be reduced to no more than 65 dB within the exterior living space of the project.



The residential design should be such that the interior living spaces are exposed to no more than a CNEL of 45 dB. When appropriate, this may be accomplished by,

- (a) Reduction of the exterior noise to which the dwelling is exposed.
- (b) Sound rated windows, suitable for the noise reduction required.
- (c) Exterior walls and roofing system configured and insulated to reduce the interior noise to acceptable levels.
- (d) Vents, mail slots, etc., located or eliminated to minimize sound propagation into the home.
- (e) Forced air ventilation as needed to provide a habitable living space, if the interior CNEL Standard is to be met with all or some windows closed.

#### Railway Movements

Late night and early morning train movements should be discouraged. Redevelopment and/or noise barriers ought to be considered for residential spaces within 200 to 400 feet of the right-of-way of the mainline railways. Barrier heights of from 14 to 18 feet may be required. For example, the residential locations adjacent to the mainline section of the Santa Fe Railroad through the central portion

of the City are exposed to CNEL's in excess of 70 dB. Barriers are needed to reduce these levels to acceptable values, however, the implementation of such a project would be very expensive. The City's Planning Staff has considered the problem of Railroad noise at length. They conclude that a substantial commitment of resources is required to significantly reduce the impact of this source of noise within the City (refer to Appendix III).

#### Construction Activity

Heavy construction should be limited to the weekday hours (7 a.m. to 6 p.m.) with minimal activity on week-ends. Noise of construction equipment should be considered in the procurement of equipment by the City departments.

#### Commercial/Industrial Noise

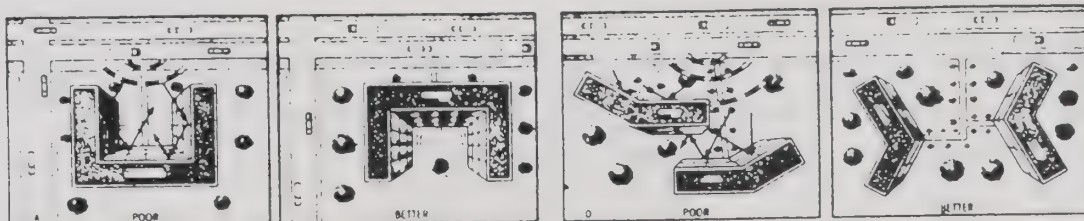
The adoption and effective implementation of a noise ordinance will insure that fixed sources of noise will remain at acceptable levels.

#### Schools, Hospitals and Parks

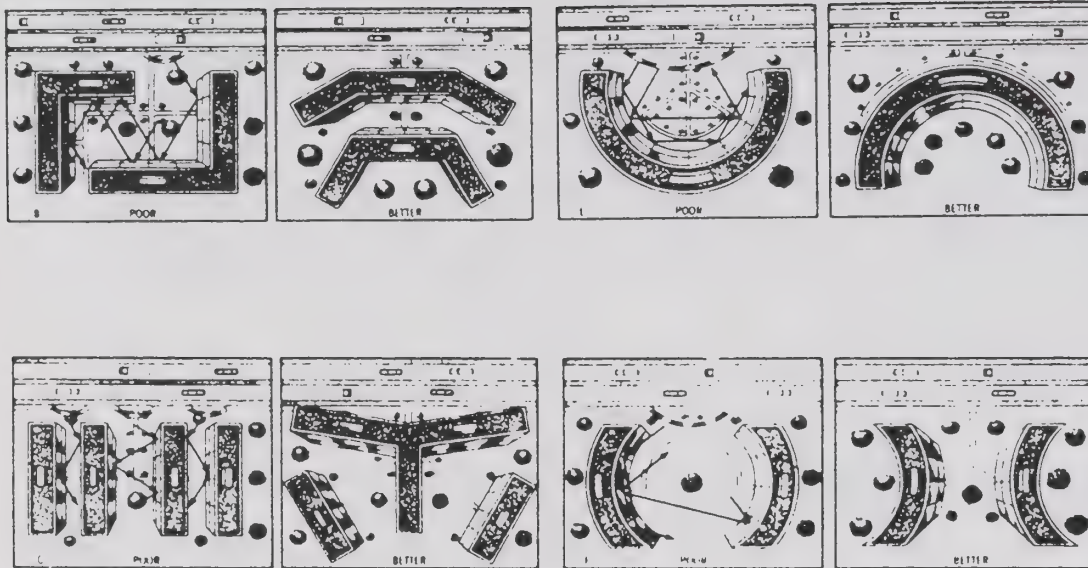
Noise ought to be a consideration in the selection of relocation of school sites, libraries, hospitals, and parks within the City.

#### Site Selection and Site Layout

Noise should be considered early in the development of new residential or noise sensitive construction. The location and orientation of the residential buildings may be configured to minimize or eliminate a noise problem for a site to be constructed adjacent to a freeway, arterial highway or rail line. For example, the following indicates "poor" and "better" building orientations for noise control:





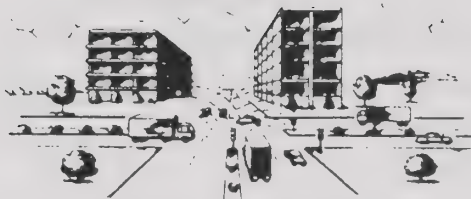
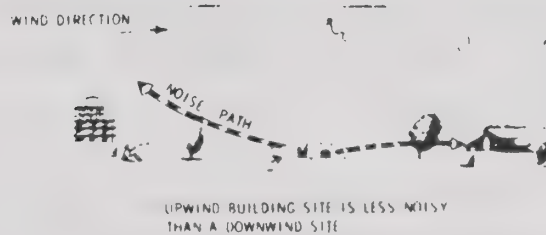


### Orientation of Buildings on Noise Sensitive Sites

In general,

1. Buildings should be located so as to take full advantage of any acoustical shielding provided by the existing terrain, natural landscaping or wooded areas of the building site.
2. Buildings should be located as far as possible from the source of greatest noise.
3. In large apartment developments, buildings should be arranged so that as many dwelling units as possible are shielded from highway traffic noise or other sources of noise.
4. On a building site which fronts on a freeway or arterial, the building should be oriented so that the long axis of the building is perpendicular to the freeway or arterial.

5. When the site will permit, the prevailing wind direction should be considered in the selection of building orientation.
6. Foliage or vegetation is of little or no value for the reduction of traffic noise unless it is very dense. At least 20 to 30 feet of mature foliage is required to provide a significant amount of noise reduction.



AVOID BUILDING SITES AT INTERSECTIONS OF MAJOR TRAFFIC ARTERIES. SUCH SITES ARE EXTREMELY NOISY DUE TO ACCELERATING, DECELERATING, AND BRAKING VEHICLES.



AVOID BUILDING SITES ON THE CRESTS OF HILLY TRAFFIC ARTERIES. SUCH SITES ARE VERY NOISY DUE TO LOW GEAR ACCELERATION NOISE.

## IMPLEMENTATION AND ACTION

Implementation of the Noise Element will be provided through the adoption of quantifiable noise standards for residential and commercial development and for noise producing activities and operations within the City. Enforcement of the standards will be the assignment of principally the Building Division, Police Department and the Planning Department. Positive actions which the City shall take to implement the Noise Element are listed below. Beyond these actions the City shall solicit community cooperation as identified in the next section. Finally, the City should encourage action on the part of County, State and Federal Agencies as indicated in the last paragraphs of this section, in order to fulfill the goals and policies of the Noise Element.

### ACTIONS TO BE TAKEN BY THE CITY

- . The City will adopt a Noise Ordinance structured along the general guidelines of the Model Noise Ordinance prepared by the State Department of Health and the County of Orange.
- . The Planning Department will from time to time submit specific implementation programs of the Noise Element through the noise impact evaluation of all land use proposals. This will be accomplished by enforcing the existing zoning and subdivision ordinances and instituting the goals and policies of the Noise Element.
- . The Building Division will continue the responsibility for the enforcement of the California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4 and the City Council Policy for Sound Attenuation in Residential Projects.
- . The Police Department will continue its responsibility for enforcing State and Federal Noise Laws for mobile sources as well as handling normal nuisance complaints in commercial and residential areas (i.e., loud parties and public gatherings).
- . The County of Orange Animal Control Department will continue the abatement of annoyance caused by barking dogs.

## COMMUNITY COOPERATION

It shall be the objective of the City to encourage community cooperation relative to the control of noise. Through the continuing action of all City Departments, Commissions and the City Council, the City shall:

- . Encourage public awareness of the potential health and welfare aspects of excessive noise.
- . Inform the community of the annoyance potential of excessive noise which may intrude upon the peace and quiet of their neighbors. The control of intrusive noise is best minimized at the source. "Sources" which are best controlled by discretion on the part of the user include:
  - Power lawn mowers and edgers
  - Power equipment, saws, drills, etc.
  - Pool pumps and related equipment
  - Air conditioners
  - Sound amplification (Hi-Fi) equipment
- . Encourage the public to consider the disturbing effects, on their neighbors, of loud activity (parties) within their home, dog barking, auto repair work, and construction related activity which might occur during the late night and early morning hours.
- . Encourage the public to consider the intrusive nature of the noise generated by their recreational activities such as that caused by motorcycles and light aircraft.
- . Inform and encourage the public to consider the potential health effects and annoyance of toys which produce loud impacts or sustained and disturbing noise.



## ENCOURAGE ACTION BY COUNTY, STATE AND FEDERAL AGENCIES

- . Seek Federal and State funding for the development of local noise surveillance and monitoring with particular emphasis on the noise produced by freeway and arterial highway traffic.
- . Seek Federal and State financial assistance for future noise studies including alternative transportation systems, community planning and development and the related noise monitoring.

## GOVERNMENTAL COORDINATION

- . The City should continue to monitor the activity of the Federal, State, County and City Governments in noise abatement.
- . Encourage Federal, State and Local Governments to consider the social and economic impacts of noise in all regional and urban planning efforts.
- . Develop a mechanism to assure the coordination of actions being considered by other jurisdictions in the field of noise control, abatement and research.
- . Coordinate with surrounding cities to reduce noise incompatibilities across City boundaries using such tools as zoning and performance standards.
- . Continue to review county and regional plans for transportation, airport operation and development, etc., to identify the environmental impact of noise and to develop alternatives for the control of major noise sources on a County and Regional basis.
- . Request the Federal and State Governments, in cooperation with standardization organizations and industrial associations to develop standards for noise level labeling of consumer products that are sources of noise.

## STREETS AND FREEWAY NOISE

- . Continue to work closely with the State Department of Transportation in the early stages of freeway routing and design modification to insure proper consideration of noise impact on the City and to insure the construction of noise barriers at locations along the Route 57 Freeway within the City.
- . In the design and construction of local streets and highways, provide sound barriers or buffer space between the highway and residential locations to the extent feasible.

## MOTOR VEHICLE NOISE

- . Recommend that the State of California adopt and enforce more rigorous noise standards governing the operations of all trucks and buses, including annual noise certification.
- . Encourage the continuing and expanded enforcement of the noise standards for motor vehicles by the State of California Highway Patrol.

## RAILROADS

- . Recommend that the rail operators minimize and where possible, eliminate horn soundings in proximity to residential areas and to minimize late night and early morning operations.
- . Encourage rail operators to maintain their trackage as required to minimize rail noise and to minimize the noise of their operations to the extent possible.

## AIRCRAFT

- . Monitor the continued development and use of Orange County Airport and Los Alamitos Naval Air Station and assess any changes in operation which may have a significant impact within the City of Anaheim.
- . Participate in the planning activities involving local or regional airport development such as that being considered at Chino Hills.

## OTHER MODES OF TRANSPORTATION

- . Encourage continuing studies of each transit corridor, including an analysis of methods of noise attenuation for those corridors which may impact the City of Anaheim.
- . Encourage the Orange County Transit District and Southern California Rapid Transit District (SCRTD) to use noise criteria as an important factor in their purchase of new buses.

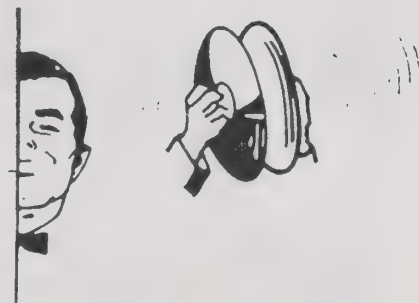
## INDUSTRIAL NOISE

- . Encourage industry to conduct research on the technology of noise abatement and control as it related to their activities.
- . Encourage the Federal and State Governments to continue to provide standards of allowable industrial noise exposure so that all workers are adequately protected against noise-induced hearing loss.

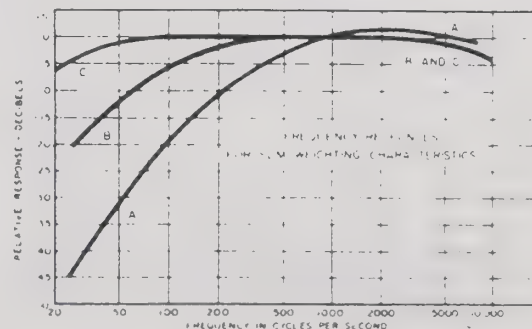
## GLOSSARY

Ambient Noise - Ambient noise is the all-encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far.

Community Noise Equivalent Level (CNEL) - A cumulative measure of community noise exposure for a 24-hour day, using the A-Weighted sound level and expressed in logarithmic units. The CNEL scale takes into account the single event sound level, single event duration, single event occurrence of the noise source. It additionally applies weighting factors which place greater significance on noise events occurring in the nighttime (10:00 p.m. to 7:00 a.m.) than during the evening (7:00 p.m. to 10:00 p.m.) or daytime (7:00 a.m. to 7:00 p.m.) respectively. The adjustment approximately accounts for the lower tolerance of people to noise during evening and nighttime periods relative to daytime periods.



A-Weighted Sound Pressure Level (dBA) - A unit of sound measure in which a single number represents the human ear's response to sound. This is accomplished by a weighting network within a sound level meter, signified as "A", assigned to the appropriate frequency bands and thereby reducing the effects of the low and high frequencies with respect to the medium frequencies. Sound level meters with a A-Weighted scale are used for community noise measurements with units being expressed as dB(A).



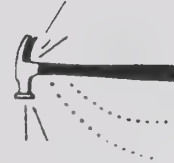
Curves showing the A, B and C weighting networks.



Day-Night Average Sound Level (Ldn) - A 24-hour A-weighted cumulative noise exposure method similar to CNEL but only applies a time of day weighting to the nighttime period (10:00 p.m. to 7:00 a.m.). Ldn is approximately  $\frac{1}{2}$  dB lower than the estimated CNEL values, and can be considered synonymous with CNEL. Ldn has been adopted by the U. S. Environmental Protection Agency (EPA) as the measure of noise exposure.



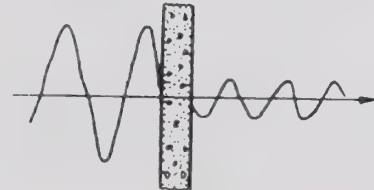
Maximum Noise Level - The maximum instantaneous level that occurs during a specified time interval. In acoustics, maximum sound pressure is to be understood for single events unless some other kind of level is specified.



Noise - Annoying, harmful or unwanted sound.

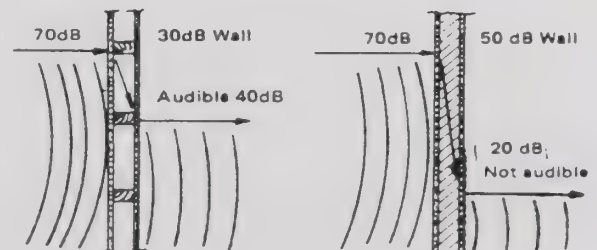


Noise Attenuation - The ability of a material substance or medium to reduce the noise level (acoustic) from one position to another. Noise attenuation is specified, in decibels (dB) as a noise transmission loss.



Noise Contours - A line connecting points of equal noise level as measures on the same scale.

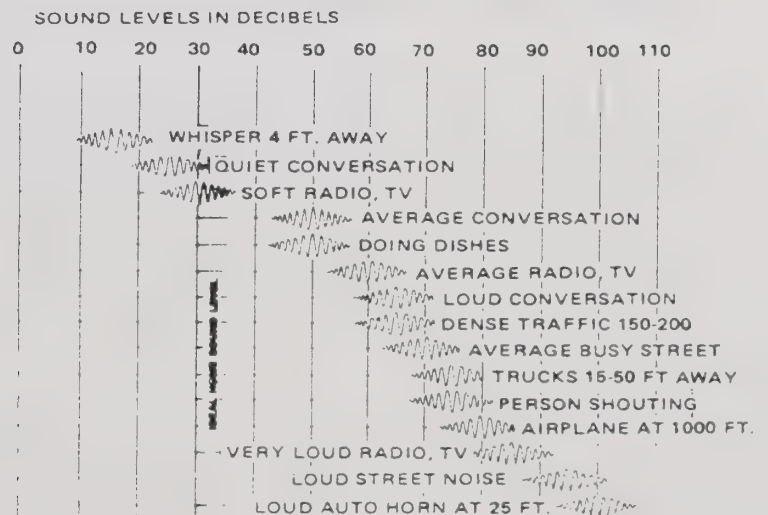
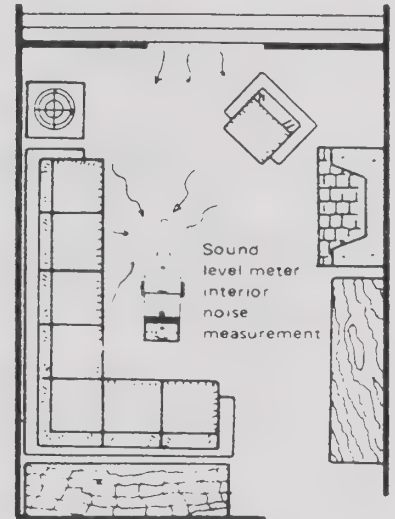
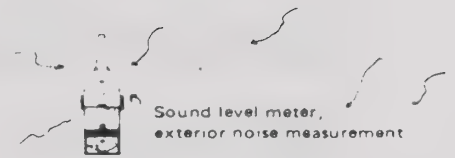
Noise Impacted Area - A specific area exposed to substantial levels of noise, usually described by a cumulative exposure rating scale.



Noise Sensitive Land Uses - Noise sensitive land uses include, but are not limited to: residential, schools, libraries, hospitals, churches, unsoundproofed offices, hotels, motels, and outdoor recreation areas. These typify land uses whose suitability is restricted by intrusive noises, hence are termed "noise sensitive". Noise sensitivity factors include: interference with speech communication; subjective judgment of noise acceptability and relative noisiness; need for freedom from noise intrusion; and sleep interference criteria.

Sound - As used herein, a reaction in the ear caused by mechanical radiant energy of a source transmitted by longitudinal pressure waves in air or other elastic medium.

Sound Level Meter - A measurement instrument, containing a microphone, or amplifier, an output meter, and one or more frequency weighting networks which is used for the determination of noise and sound levels.



## REFERENCES

1. "Highway Noise, Measurement, Simulation, and Mixed Reactions", Highway Research Board, Report 117, 1971.
2. "Highway Noise, A Design Guide for Highway Engineers", Highway Research Board, Report 117, 1971.
3. "Highway Noise, A Field Evaluation of Traffic Noise Reduction Measures", Highway Research Board, Report 114, 1973.
4. T. J. Schultz, "Noise Assessment Guidelines - Technical Background", U. S. Department of Housing and Urban Development, Report No. TE/TN 172, 1971.
5. "Aircraft Noise Impact", U. S. Department of Housing and Urban Development, Report TE/NA 472, 1972.
6. "A Study of the Magnitude of Transportation Noise Generation and Potential Abatement", U.S. Department of Transportation, a set of seven reports, 1970.
7. "Impact Characterization of Noise Including Implications of Identifying and Achieving Levels of Cumulative Noise Exposure", EPA Aircraft/Airport Noise Study Report. July 1973.
8. "Community Noise Assessment - Ocean Approaches at Los Angeles International Airport", Bolt, Beranek, and Newman, Inc., Report 2418, 1972.
9. "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances", U. S. Environmental Protection Agency, Report PB 206 717 (National Technical Information Service No. NTID 300.1), 1971.
10. "Industrial Noise Manual", American Industrial Hygiene Association, (14125 Prevost Street, Detroit, Michigan 48227, \$15.00), 1966.
11. "Noise Control in Multifamily Dwellings", U.S. Department of Housing and Urban Development, (Supersedes FHA No. 750), 1963.

## APPENDIX A

Excerpts from: California Government Code,  
Chapter 775, Section 65302(g)  
Relative to Local Planning Elements (Noise)

### GOVERNMENT CODE

### § 65302

(g) A noise element, which shall recognize guidelines adopted by the Office of Noise Control pursuant to Section \* \* \* 46050.1 of the Health and Safety Code, and which quantifies the community noise environment in terms of noise exposure contours for both near and long-term levels of growth and traffic activity. Such noise exposure information shall become a guideline for use in development of the land use element to achieve noise compatible land use and also to provide baseline levels and noise source identification for local noise ordinance enforcement.

The sources of environmental noise considered in this analysis shall include, but are not limited to the following:

- (1) Highways and freeways.
- (2) Primary arterials and major local streets.
- (3) Passenger and freight on-line railroad operations and ground rapid transit systems.
- (4) Commercial, general aviation, heliport, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.
- (5) Local industrial plants, including, but not limited to, railroad classification yards.
- (6) Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

The noise exposure information shall be presented in terms of noise contours expressed in community noise equivalent level (CNEL) or day-night average level (L<sub>dn</sub>). CNEL means the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m. L<sub>dn</sub> means the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.



## APPENDIX A (Continued)

The contours shall be shown in minimum increments of 5db and shall continue down to 60db. For areas deemed noise sensitive, including, but not limited to, areas containing schools, hospitals, rest homes, long-term medical or mental care facilities, or any other land-use areas deemed noise sensitive by the local jurisdiction, the noise exposure shall be determined by monitoring.

A part of the noise element shall also include the preparation of a community noise exposure inventory, current and projected, which identifies the number of persons exposed to various levels of noise throughout the community.

The noise element shall also recommend mitigating measures and possible solutions to existing and foreseeable noise problems.

The state, local, or private agency responsible for the construction, maintenance, or operation of those transportation, industrial or other commercial facilities specified in paragraph 2 of this subdivision shall provide to the local agency producing the general plan, specific data relating to current and projected levels of activity and a detailed methodology for the development of noise contours given this supplied data, or they shall provide noise contours as specified in the foregoing statements.

It shall be the responsibility of the local agency preparing the general plan to specify the manner in which the noise element will be integrated into the city or county's zoning plan and tied to the land use and circulation elements and to the local noise ordinance. The noise element, once adopted, shall also become the guideline for determining compliance with the state's noise insulation standards, as contained in Section 1092 of Title 25 of the California Administrative Code.

APPENDIX B  
NOISE MEASUREMENTS AND LOCATIONS  
CITY OF ANAHEIM

NOISE MEASUREMENTS LOCATIONS:      FIGURE B-1

NOISE MEASUREMENTS:                      TABLE B-1

The measurements were recorded during mid-day, peak-hour and/or late night periods as was considered most appropriate for the location.

During the measurement period, the temperature was in the range from about 60<sup>0</sup> to 80<sup>0</sup> F, it was not raining and the pavement was dry.

Higher wind velocities, significantly lower or higher temperatures and rain or wet pavement have a significant impact on noise and noise propagation.





NOISE MEASUREMENT LOCATIONS

FIGURE B-1





TABLE B-1

## NOISE MEASUREMENTS AND NOISE MEASUREMENT LOCATIONS

## CITY OF ANAHEIM

Location Number*	Location	L <sub>eq</sub>	L <sub>90</sub>	L <sub>50</sub>	L <sub>10</sub>
1	Anaheim General Hospital Medical Center parking lot, 3356 W. Ball Rd. offset with building along road.	67.1	56.8	63.0	69.5
2	Residential area, 21' south of 3434 Orange.	66.0	60.8	64.5	69.8
3	Orangeview Jr. High parking lot, 150' west of Knott; 25' from classroom.	56.0	50.3	53.8	59.0
4	Centralia School parking lot, 49' north of Lincoln; 150' from classroom.	65.0	57.5	63.8	68.3
5	Residential area, at empty plot, 55' north of Lincoln, directly across Toy City.	64.5	59.0	63.5	68.0
6	Near mobile home park, 30' north of Lincoln.	68.6	61.5	67.3	72.0
7	Zodys shopping center parking lot, 100' north of Lincoln, 50' offset from Imperial Bank.	66.7	61.5	65.5	70.3
8	West Anaheim Community Hospital, 3033 W. Orange, west of Beach Blvd., north of Orange.	61.1	55.8	59.8	64.5
9	Residential area; cul-de-sac. 67' north of 2800 W. Lincoln and Teri Circle.	66.0	58.3	65.5	69.5
10	Mini shopping center near Dale Ave. 50' north of Lincoln. Offset from Colonial House of Flowers: 20'.	66.2	59.5	64.8	70.0

\*Refer to Figure B-1 for the measurement locations

# NOISE MEASUREMENTS AND NOISE MEASUREMENT LOCATIONS, cont'd.

Location Number	Location	L <sub>eq</sub>	L <sub>90</sub>	L <sub>50</sub>	L <sub>10</sub>
11	Keno's 24 hour restaurant and Lounge parking lot, 104' north of La Palma (near Magnolia)	60.4	57.5	60.0	63.0
12	Color Tile and Drive-in Dairy parking lot, 70' north of Lincoln.	65.8	60.0	63.8	69.3
13	Maxwell Elem. School parking lot, 116' west of Magnolia.	60.4	53.5	58.0	64.8
14	Magnolia High School parking lot, near school's field, 230' south of Ball Road.	60.6	55.5	59.3	64.0
15	Gilbert Medical Center parking lot, 925 Gilbert, north of Ball Road.	58.7	50.0	56.3	62.0
16	Motel Granada Inn parking lot, 105' north of Lincoln, 38' from building.	62.6	57.3	61.5	65.5
17	Residential houses, intersection of Rhodes Ave. & Ventura St., north of Santa Ana Fwy.	62.7	59.0	61.0	63.8
18	Residential houses, Coronet Avenue cul-de-sac, south of Riverside Fwy., west of Brookhurst	59.7	57.0	59.8	61.5
19	Behind car wash on Lincoln, 28' from Ranchito St. Blower at work.	71.1	70.5	71.0	72.5
20	Near Midwood cul-de-sac, residential area; 5' east of Brookhurst.	72.4	63.5	69.3	76.3
21	Marshall Elem. School at Columbine and Glen Ave., 250' north of La Palma, next to playground.	62.8	56.8	60.0	67.0
22	Martin Luther King Hospital, parking lot, Romneya Drive.	59.4	55.3	58.0	60.5
23	The Crescent Residential Apartments, parking lot, north of Santa Ana Fwy., at 1830 Crescent Avenue.	69.3	66.0	69.0	71.5
24	London Kebab House parking lot, 25' west of Euclid (near Katella).	67.6	60.5	64.8	70.0

NOISE MEASUREMENTS AND NOISE MEASUREMENT LOCATIONS, cont'd.

Location Number	Location	L <sub>eq</sub>	L <sub>90</sub>	L <sub>50</sub>	L <sub>10</sub>
25	Crocker Bank parking lot, intersection of Ball and Euclid, 60' south of Ball Road.	66.0	62.0	65.0	68.8
26	Hospital parking lot, 1660 W. Broadway. Building located 200' south of Broadway.	52.6	47.3	50.0	56.0
27	Anaheim Hospital parking lot, 83' north of La Palma Ave.	64.7	59.3	62.3	65.5
28	Residential homes, intersection of Chevy Chase Dr. and Condor St., south of Riverside Fwy.	60.3	57.8	59.5	62.8
29	Thalia St., near railroad crossing, in front of residential home; south of Lincoln Ave, North of Broadway	68.9	55.8	58.5	64.0
30	Anaheim High School, 32' north of Lincoln, at Ohio Street.	67.9	61.5	66.5	70.5
31	Concrete Wave Skateboard Park, Citron St., 15' from residential apartments.	62.5	59.0	61.3	64.8
32	Casa Mañana Mexican Food parking lot, 22' west of Harbor Blvd., near Ball and Santa Ana Fwy.	69.4	66.3	68.5	71.8
33	Apartments, intersection of Midway Drive and Palm Street, north of Santa Ana Fwy.	72.9	69.5	72.0	75.3
34	Hamburger House parking lot, 31' west of Harbor Blvd. (near Katella)	70.0	60.3	66.8	73.3
35	Good Samaritan Hospital parking lot, Anaheim Blvd, north of Ball Rd.	61.1	56.5	59.3	63.5
36	Residential homes, intersection of Rosewood Ave, and Maplewood St., south of Riverside Fwy.	61.2	59.3	61.0	63.3
37	Mobile homes parking lot, 30' east of State College Blvd., near Riverside Fwy. (south of the freeway).	63.7	61.5	63.3	66.3



NOISE MEASUREMENTS AND NOISE MEASUREMENT LOCATIONS, cont'd.

Location Number	Location	L <sub>eq</sub>	L <sub>90</sub>	L <sub>50</sub>	L <sub>10</sub>
38	Capri Coffee Shop parking lot, 28' south of Lincoln Ave., near State College Boulevard.	64.7	59.0	63.3	67.3
39	Apartments, west of State College Blvd., and north of Ball Road. (Behind Carl's Jr. and engine re-building shop)	74.8	56.3	62.0	79.8
40	Commercial building, 32' west of 1717 S. State College Blvd, near north of Katella Avenue.	72.7	62.8	67.5	75.8
41	Sunkist Gardens, space 49, at Sunkist Ave.	62.4	55.5	59.5	63.5
42	Katella High School parking lot, 90' south of Wagner, east of State College Blvd., offset with building.	61.2	50.0	55.5	65.8
43	Mancos Pl. and Diana Pl. intersection, south of South St., west of Route 57, next to road.	62.8	58.5	60.3	63.5
44	236 Shakespeare (near Underhill), west of Route 57 Fwy.	63.9	60.8	63.8	66.3
45	Commercial buildings, parking lot, 260 Sunshine Way.	67.2	63.5	66.0	69.0
46	Shopping center parking lot next to residential buildings, 30' north of Lincoln, east of Rio Vista.	69.3	62.0	68.0	72.8
47	Commercial buildings, Kraemer Place and La Mesa Ave. intersection, offset with Trane Building.	70.8	68.5	70.0	73.5
48	Calcomp parking lot, 20' east of Kraemer, south of Miraloma Avenue.	65.8	55.5	63.3	69.5
49	Glen Johnson Co. parking lot, Grove Street.	70.2	67.5	69.8	72.3
50	Commercial buildings parking lot, 35' north of La Palma east of Tustin.	62.9	54.3	59.0	66.3

NOISE MEASUREMENTS AND NOISE MEASUREMENT LOCATIONS, cont'd.

Location Number	Location	L <sub>eq</sub>	L <sub>90</sub>	L <sub>50</sub>	L <sub>10</sub>
51	Residential homes, 48' east of Tustin, south of Riverside Fwy, at Rogue Dr.	62.0	57.8	61.0	64.5
52	Nohl Canyon Elem. School parking lot, 25' south of Nohl Ranch Rd. From measuring location to curb there is a slope. Road is ~5' above location.	59.6	47.3	54.5	63.0
53	Canyon General Hospital parking lot, 200' west of Lakeview.	59.2	54.3	57.0	60.5
54	Residential area, Westridge cul-de-sac; east of Royal Oak, north of Nohl Ranch Rd.	47.5	45.0	46.3	50.3
55	Residential area, intersection of Bergh and Jerrilee Lane.	59.6	57.3	59.0	61.5
56	Arco station, 50' east of Imperial Hwy., north of Riverside Fwy. and south of La Palma.	65.9	60.8	64.8	68.8
57	Parking lot near Imperial Hwy, 80' north of Santa Ana Canyon Road.	60.7	55.5	59.3	63.3
58	Canyon High School field, 100' south of Santa Ana Canyon Road.	64.1	56.0	60.8	67.3
59	Imperial Elem. School parking lot, 30' from classrooms, 100' east of Imperial Hwy.	57.4	54.5	56.5	60.3
60	Cul-de-sac at Paseo Magellan and Calle Diaz, 200' south of Santa Ana Canyon Road.	57.1	52.3	54.3	59.0
61	Residential area, Solomon Drive, 160' north of Santa Ana Canyon Road.	52.6	42.0	46.8	54.3
62	Residential area, driveway, 80' south of Santa Ana Canyon Rd., near Quintana	69.1	58.8	64.8	71.8
63	Shopping center parking lot, north of Nohl Ranch Rd., east of Anaheim Hills	61.5	53.8	59.3	65.8

# NOISE MEASUREMENTS AND NOISE MEASUREMENT LOCATIONS, cont'd.


Location Number	Location	L <sub>eq</sub>	L <sub>90</sub>	L <sub>50</sub>	L <sub>10</sub>
64	Residential area, intersection of Ribazo and Roberl, 200' north of Santa Ana Canyon Road.	52.7	49.0	52.3	55.0
65	Residential area, 1200 N. Hondo St. 102' north of La Palma.	59.5	49.5	53.5	62.0
66	Residential area at 7592 Calle Granada, cul-de-sac, south of Riverside Fwy.	61.3	59.3	61.3	63.5
67	Residential homes at 900 S. Calle Venado, 45' south of Serrano Ave.	57.2	44.3	48.0	60.3
68	Residential homes, 49' north of La Palma at Melaine Dr. Homes at La Palma have 6' wall between road.	54.7	46.0	49.5	58.8
69	Weir Canyon Road and Santa Ana Canyon Road intersection; line of sight with Riverside Freeway	61.0	54.3	57.8	63.5







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